

Numerical
Methods

SCORE

___ / 20

Chapter: Applied Mathematics • Level ★★★ • Time:
30 min

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

- ✓ Apply the bisection method.
- ✓ Apply one step of Newton's method.
- ✓ Compare convergence speeds.
- ✓ Understand approximation error.



Section A • Concept Check

• BEGINNER

$4 \times 1 = 4$

- 1 A root lies between $x = 2$ and $x = 6$. The first bisection midpoint is:
☐ A. 4 ☐ B. 3 ☐ C. 5 ☐ D. 8
- 2 Newton's method on $f(x) = x^2 - 9$ from $x_0 = 4$ gives $x_1 =$:
☐ A. 3.125 ☐ B. 3 ☐ C. 3.5 ☐ D. 4.875
- 3 Newton's method converges faster because it uses the:
☐ A. midpoint ☐ B. derivative (slope)
☐ C. sign change ☐ D. average
- 4 As a converging method iterates, the error:
☐ A. grows ☐ B. stays constant
☐ C. gets smaller ☐ D. oscillates forever



Section B • Problem Solving

• INTERMEDIATE

$2 + 3 \times 3 = 11$

- 5 The bisection midpoint of $[2, 6]$ is _____.
- 6 Bisection requires a _____ change between endpoints.
- 7 A root lies between $x = 2$ and $x = 6$. Find the first bisection midpoint.

- 8 Apply one step of Newton's method to $f(x) = x^2 - 9$, starting at $x_0 = 4$.

- 9 Why does Newton's method typically converge faster than bisection?



Section C • Challenge

• CHALLENGE

5

- 10 What happens to the error as a converging method iterates?

Reflection — the most useful thing I learned: _____

A ___/4 B ___/11 C ___/5 Total ___/20

Teacher's Signature _____

Parent's Signature _____

ANSWER KEY — FOLD OR CUT BEFORE HANDING OUT

1-A 2-A 3-B 4-C | 5 4 6 sign 7 = 4 8 = $x_1 = 4 - 7/8 = 3.125$ 9 = It uses the slope to make smarter jumps toward the root | 10 = It gets smaller, approaching zero

